Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| Interference Immunity Specifications | ) | ET Docket No. 03-65 |
| For Receiver | ) | |
| | ) | |
| To: The Commission | ) | |

**COMMENTS OF IEEE 802.18 IN ET DOCKET NO. 03-65**

IEEE 802.18, the Radio Regulatory Technical Advisory Group ("RR-TAG") within IEEE 802[1] hereby respectfully offers our Comments in the above-captioned Proceeding (the "NOI").[2]

The members of the RR-TAG that participate in the IEEE 802 standards process are interested parties in this Proceeding. IEEE 802, as a leading consensus-based industry standards body, produces IEEE 802 standards[3] for wireless networking devices, including wireless local area networks ("WLANs"), wireless personal area networks ("WPANs"), and wireless metropolitan area networks ("Wireless MANs"), all of which require spectrum resources in order to provide the public with the benefits of wireless networking.

This document was also reviewed and approved by the 802.11, 802.15, and 802.16 wireless working groups.

The 802.18 RR-TAG appreciates the opportunity to provide these Reply Comments to the Commission.

---

[1] The IEEE Local and Metropolitan Area Networks Standards Committee ("IEEE 802" or the "LMSC")

[2] This document represents the views of the IEEE 802.18 RR-TAG and the working groups listed above. It does not necessarily represent the views of the IEEE as a whole or the IEEE Standards Association as a whole.

[3] IEEE 802 Standards currently operate predominantly in unlicensed Part 15 spectrum. More spectrum will be required to meet future needs for unlicensed devices and we commend the Commission for undertaking this Notice of Inquiry.

## INTRODUCTION

1. The FCC recently issued a Notice of Inquiry[4], in which the Commission is soliciting input on the issue of including receiver interference immunity specifications into the Commissions' spectrum policy. To quote from the Introduction to the Notice of Inquiry:

> *"By this action, the Commission begins consideration of incorporating receiver interference immunity performance specifications into our spectrum policy on a broader basis. Such specifications could be in the form of incentives, guidelines or regulatory requirements (or a combination of these) in particular frequency bands, services or across bands and services. We believe that incorporation of receiver performance specifications could serve to promote more efficient utilization of the spectrum and create opportunities for new and additional use of radio communications by the American public. …"*[5]

2. The IEEE 802.18 RR-TAG has reviewed the questions put forth in the Notice, and formulated a number of responses that are presented in this document. The answers reflect the general view of the IEEE 802.18 RR-TAG that the process by which receiver performance is specified should not be modified from current practice. To summarize, we believe that the current approach of defining a service in terms of transmitter power, transmit spectrum (both in-band and out of band emissions), modulation type(s), frequency band(s), allowable spurious emissions (both Tx and Rx), and guidelines on the nature of the service provides much of the information needed by a radio receiver manufacturer. The issue of design trade-offs between receiver performance, circuit complexity, physical size, power requirements, and ultimate cost are the domain of the radio manufacturer and should not be made the subject of a regulatory process.

3. The document presented here is organized as a series of questions and answers. To facilitate readability, the Commissions' queries are duplicated in *italics* and then followed by our

---

[4] *See*, FCC Docket ET 03-65, Adopted March 13, 2003, Released March 24, 2003.

response. Those questions which we believe are outside of the area of expertise of the 802.18 RR-TAG are not addressed.

## RESPONSES TO THE COMMISSION'S INQUIRIES ON RECEIVER INTERFERENCE IMMUNITY SPECIFICATIONS

*[FCC] 14. We request comment and information…..*

*- Are there any special hardware designs, software methodologies, or new technologies available that would significantly enhance receiver immunity performance?*

4. Receiver immunity can be improved through various means, including incorporation of processing gain (e.g., direct sequence spread spectrum), higher performance filters in the IF, higher overload characteristics for the receiver front end, improved shielding, etc.

*- How are these performance factors related to frequency and operating power, and influenced by the nature of the RF environment?*

5. In general, design cost increases with operating frequency (e.g., receiver LNAs for 5GHz are typically based on GaAs or SiGe processes which are more costly than conventional silicon bipolar devices). Improving a receivers' immunity performance often requires the use of front end circuitry with higher overload capability which in turn requires increased power dissipation in those devices. Dynamic range requirements and capability are influenced by the frequency band in which the device operates. High dynamic range can also be difficult to obtain at very high frequencies.

*- To what extent, and in what way, are some factors affecting interference immunity relatively more important than others across receivers used with different services or across devices that receive signals transmitted using different modulation methods?*

---

[5] *Id*., at 1.

6. Among the factors that have a direct impact on receiver immunity is proper RF shielding and adequate RF filtering. Many receiver interference issues are related to the lack of sufficient shielding of the sensitive high-gain sections (typically the IF circuits) in the receiver and front-end overload due to inadequate rejection of out-of-band signals. For some services, these factors can be critical in securing reasonable immunity. Another important factor is designing receiver circuitry with enough dynamic range to handle high-level in-band signals. These three factors form the basis of good receiver design regardless of frequency band and modulation types. A lesser factor is IF bandwidth. Wideband receivers will generally have lower immunity than narrow-band design, however, baseband processing can help in improving wideband receiver performance.

*- Are there factors that must be considered as a group and not independently due to their cross-interactions or relationships with other factors?*

7. In general, wider bandwidth receivers will need assistance in the form of some kind of baseband processing (e.g., coding schemes, spread spectrum systems) in order to ensure an acceptable level of in-band immunity and receive sensitivity.

*- Are some factors less important in providing interference immunity in certain modulation systems or receiver designs?*

8. As noted previously, receiver IF bandwidth in modern designs has a lesser impact on immunity performance than was the case in the past. Another is the type of receiver architecture used. For example, with the higher-performance components available to the radio designer today, a direct-conversion receiver can compare favorably to a super-heterodyne design in terms of immunity.

*- How should any such differences be treated in specifying receiver immunity guidelines or standards?*

9. Receiver guidelines should focus on the common factors that foster higher levels of interference immunity. As stated above, the inclusion of good shielding, RF front-end filtering, and dynamic range are applicable across frequency ranges and modulation types. Mandating their use, though, would prove problematic as the amount and nature of each factor will depend on the class of service required for the particular application.

- *Can receiver interference immunity parameters be ranked in accordance with their level of importance to performance? What procedures or criteria should be used to determine how to trade off the level of receiver performance with the practical issues of cost and implementation?*

10. The issue of design trade-offs between receiver performance, circuit complexity, physical size, power requirements, and ultimate cost are the domain of the radio manufacturer and should not be made the subject of a regulatory process.

- *Should system characteristics such as signal processing gain and modulation methods that facilitate immunity from interference in receivers be considered germane to the process of establishing receiver performance guidelines or standards?*

11. The inclusion of processing gain and/or modulation methods that improve receiver interference immunity should be left to the discretion of the standards development organization ("SDO"). Performance parameters in receiver guidelines should be based on the requirements of the particular radio service.

*- Do new and emerging advanced radio systems, including those employing digital modulation, offer potential for significantly improving receiver immunity to interfering signals? What are the inherent performance limitations of these technologies?*

12. Newer technologies and techniques can certainly be utilized to improve radio performance. Receiver guidelines and spectrum policy making can take these factors into account, but the mandating of a particular implementation of the new technologies is what should be avoided.

*[FCC] 15. As mentioned above, … We request comment on the following questions concerning the interference environment in which receivers operate:*

*- What are the characteristics of the RF environment in which existing receivers or groups of receivers operate?*

13. The RF environmental characteristics depend on the particular spectrum and the nature of the adjacent bands. The interference can include impulse noise, spurious signals, RF overload from in-band and out-of-band signals, fading, and multipath induced inter-symbol interference. In a shared spectrum regime, the interference potential is higher than in a more restricted band.

*- If studies were to be carried out, what would be an efficient way to capture any relevant data or pertinent events given the dynamic changing nature of the environment over time?*

14. RF channel characterization is many times a tedious and time-consuming process. Often, specialized equipment is required first to assess the impulse response of the channel, and then RF surveys must be conducted to get a measurement of the RF signals that would be captured by a receiver. It should be noted that for the more popular bands, a considerable amount of channel sounding data often already exists (e.g. IEEE papers), so that only RF surveys are required to capture transient interference at a particular location.

*- Should different receiver specifications or approaches be taken based on the environment in which the receiver is expected to operate (for example, high-powered or lower-powered frequency bands).*

15. The nature of the RF environment is one of the primary determinants of receiver performance specifications. The design choices made by the radio manufacturer to meet these specifications provides the opportunity for the manufacturer to exercise creativity in producing a competitive product.

*16. Another approach to describing the interference environment ….We request responses to the following questions relating to the establishment of a generic receiver environment and possibilities for measuring receiver performance there under:*

*- If a generic environment were employed, how many conditions would have to be considered to cover the variability of the natural environments, (i.e., narrow band, wide band, closestfrequency separation for interferer and carrier, etc.)?*

16. A number of parameters would have to be considered. It is difficult to develop a "one size fits all" model. The parameters would have to include the frequency of operation, the RF bandwidth, the channel bandwidth, the types of modulation employed, geography, and the nature of any existing RF sources both in-band and out, and the grade of service required.

*- What measures of performance translate into good, acceptable, or poor operational metrics?*

17. The metrics determining acceptance levels are very system specific and are not viewed as being something that lends itself to general usage. The two primary metrics are perceived quality for voice and image and bit error rate for data.

*- Could manufacturers agree on performance categories and could quantifiable ranges be established for these categories? How many categories would be needed and where should the threshold for acceptable performance be set among those categories?*

18. Quality of service is application specific. A considerable amount of work in the SDOs (e.g. 802 committees) addresses these issues already.

*[FCC] 17. Digital technologies, in particular, provide flexibility for controlling almost all aspects of transceiver performance. …… we seek comment on the elements of system design that should be included in receiver guidelines/standards and how we could limit the impact of receiver guidelines/standards on system design flexibility.*

19. It is our viewpoint that the specifying of a particular signal processing algorithm, filter type in the IF, receiver architecture, or equivalent is not appropriate in a regulatory arena.

*[FCC] B. Incorporation of Receiver Interference Immunity Performance Guidelines and Standards intoSpectrum Policy*

*[FCC] 18. We seek information and comment on how best to incorporate receiver interference immunity performance: voluntary industry standards; guidelines promulgated by the Commission, either in technical publications or as advisories in the rules; and mandatory standards adopted into the rules. As a general matter, we would prefer to rely primarily on voluntary programs that are supported and managed by industry, in conjunction with user groups as appropriate, to establish and maintain guidelines and standards for receiver immunity performance, rather than formally incorporate them into our regulatory programs. We believe that this approach provides the greatest flexibility for those developing and producing products to modify and update technical guidelines and standards in response to changes in technology, consumer desires, and economic conditions. We also believe that spectrum users have an incentive to reach voluntary agreements that provide for additional spectrum use. For example, the PCS industry has developed more rigorous standards than the Commission has imposed. On the other hand, we recognize that under a voluntary approach, if owners of non-conforming receivers experience interference, this might produce an incumbency problem that may limit efficient use of the spectrum. We seek comment on these issues.*

20. We believe, as does the Commission (above), in voluntary standards (such as IEEE 802 wireless standards) instead of incorporating receiver performance metrics into a mandatory specification. The fact that some equipment may not meet all of the specifications does not necessarily invalidate the process. Also, it must be recognized that “future-proofing” equipment is very difficult (e.g., television receivers) and that currently acceptable specifications will change over time.

*[FCC] 19. At the same time, we will need to maintain a cooperative relationship with those managing voluntary standards to ensure that they provide the performance levels necessary to support more efficient use of the radio spectrum. There may also be instances where for various reasons it might be necessary or desirable for the Commission to exercise a greater role in the development and management of guidelines or standards. In such cases we would prefer an approach by which the Commission would maintain the specified guidelines or standards in either an FCC technical publication, such as the "OET Bulletin" series or an advisory in the rules. Finally, there may be some cases where it will be necessary to incorporate the specifications of the standard into our rules. We request comment on the following questions with regard to the manner in which to incorporate receiver guidelines and standards into our rules:*

*- What approaches should the Commission use for implementing receiver immunity performance into its spectrum policies? Commenting parties are specifically invited to submit additional measures to augment the three approaches suggested above or to suggest completely different plans.*

21. We invite the Commission to take a more active role in participating with SDOs such as IEEE 802. Active participation will foster the development of the receiver guidelines the FCC is looking for, and help to promote improved spectrum utilization.

*- What benchmarks should the Commission use in determining the approach it should use in implementing specific receiver interference immunity performance guidelines or standards into its spectrum policies?*

22. When Commission representatives were present in SDO meetings a beneficial exchange of ideas occurred. The Commission should consider the expediency offered by taking advantage of the expertise available in SDOs such as IEEE 802.

*- With what organizations should the Commission work with to develop receiver performance requirements?*

23. The example of the success of the 802.11 wireless LAN standard development and resulting successful marketing of 802.11 based devices suggests that close liaison with industry based groups such as the IEEE 802 should move forward. In this instance, receiver performance requirements were not mandated, but were generated as a result of the standards development process.

*- How should standards or guidelines be implemented for services in which licensees have control over the receivers that are used, such as the cellular and PCS services, and in which they do not have control over the receivers, such as broadcast services?*

24. We believe the Commission has done an excellent job in this area to date, and recommend that no significant change in the current process be made.

*- What are the cost implications of the various options for approaches for incorporating receiver interference immunity into our spectrum policies in terms of both cost of equipment and flexibility for users/system designers?*

25. A mandatory approach to specifying receiver interference immunity is, in our opinion, not the best approach to take. We believe that a design guideline resident within a standard or an FCC advisory would serve better.

*- We also seek comment on how to enforce any receiver standards.*

26. We suggest that enforcement would be on a level of fines and fees imposed in response to verified user complaints concerning equipment that had been declared compliant with a particular standard and later found to be in violation.

*[FCC] 20. We also request comment on the criteria that should be used in determining how to specify the form of immunity guidelines or standards. Guidelines/standards can be in the form of performance criteria that apply to the functional capabilities of a device or of design specifications for the manufacture of portions of a device. In general, we believe it is desirable to continue the Commission's traditional preference to specify guidelines/standards as performance criteria, and to make such guidelines/standards voluntary rather than mandatory. This approach gives manufacturers freedom to design the internal configurations of their products to compete on both price and functionality. However, there may be instances where it would be more appropriate to specify guidelines/standards for the design of some or all of the features of a device that affect interference immunity. We request comment on the forms in which we should specify receiver interference immunity performance guidelines/standards and invite commenting parties to submit suggestions for alternative forms of specifying receiver interference immunity performance guidelines/standards. We also request comment on the circumstances under which any given form should be employed. Finally, we ask how should the public be informed of the interference immunity performance of receivers and the relevant guidelines for specific types of radio operation, i.e., how would consumers know about receiver performance in order to make informed decisions?*

27. We believe that enforcement by means of fines and forfeiture imposed on manufacturers in response to verified user complaints (as is currently done) is sufficient. Equipment that had been declared compliant with a particular standard (by means of a notice placed on the equipment) and later found to be in violation of that standard would allow the Commission to take against the manufacturer if it so chose.

28. User education is an important element in the progression of any new technology. The education can occur via informative annexes placed in the equipment manuals and/or brochures, advertisements carried on the popular electronic media (web sites can be quite effective), and articles in print media.

*[FCC] 21. We also seek comment on the relationship between the appropriateness of receiver standards and models used to manage the spectrum. Limiting transmitter in-band power and spill-over into adjacent bands and areas, together with the definition of assigned frequency bands and areas, provide substantial definition to the interference environment in which licensees must design their systems. Given these rules, would the costs and benefits of improved receiver interference performance be internal to licensees, and would they thus make efficient decisions regarding receiver performance? Would there be a need for receiver standards under a fully implemented property rights model, where markets allocate exhaustively and exclusively defined spectrum usage rights? How would such rules affect licensees, such as broadcasters, who do not have a decisional role in the performance of consumer receivers?*

29. The current approach is viewed as being generally sufficient with regards to receiver design. As the Commissions notes above, defining the class of service in terms of transmitter power, transmit spectrum, modulation type(s), frequency band(s), allowable spurious emissions, and the nature of the service provides much of the information needed by manufacturers. The manufacturer of the receiver should be allowed to make the design cost decisions and apply any innovative ideas in providing a better product. Through frequency sharing, improved performance is obtained due to the resulting competition. With regards to the more restricted allocations, future users would need to work with the incumbents in defining sharing technology.

Broadcasting is a different service wherein the user (typically the consumer) of the equipment decides the level of performance they are willing to pay for.

*[FCC] 22. We believe that the Commission has the necessary statutory authority to promulgate receiver immunity guidelines and standards under Sections 4(i), 301, 302(a), 303(e), (f), and (r) of the Communications Act of 1934, as amended.*

*- We request comment on this assessment of our authority.*

30. In our view the Commission has sufficient authority.

*[FCC] C. Use of Receiver Interference Immunity Performance Guidelines and Standards in Specific Radio Services*

*[FCC] 24. … it appears more tractable to consider grouping the service related receivers immunity performance parameters that would most directly impact the development of receiver metrics. One grouping by service would include:*

*1) public safety services,*
*2) satellite services,*
*3) mobile services,*
*4) fixed terrestrial services, and*
*5) broadcast services.*

*Another grouping by area of use could consider services functioning in metropolitan and rural areas.*

*We therefore ask for information on the cost implications of the various options for minimum immunity specifications for receivers used with the various radio services. We seek comment on issues relating to receiver immunity performance and guidelines/standards in our suggested service groupings as discussed below. We also seek comment on whether these groupings are appropriate, or whether grouping by other factors such as frequency band or operating bandwidth are more appropriate.*

31. The design of radio receivers for the various services listed above proceeds along the same lines as for other services. The primary difference is the grade of service requirements the various segments need. Public safety, for example, has a very high grade of service and so directs the receiver design towards an approach incorporating more shielding, additional filtering, and more robust circuitry.

*[FCC] 25. Public safety services –….the operating requirements of public safety communications systems would seem to warrant or even necessitate the use of receiver immunity performance guidelines/standards that are tighter than those for general communication services. This could be affected perhaps by requiring that the guidelines/standards for public safety receivers be set higher than those for other equipment. We ask the following questions in this regard:*

*- Should we adopt an approach that would subject public safety communications systems to higher requirements for receiver interference immunity performance than other classes of receivers?*

*- What parameters of public safety system performance should be subject to minimum guidelines/standards for immunity to interference and how should we establish such guidelines/standards?*

*- What values should be specified for the parameters of public safety receiver interference performance?*

*- Are the reliability needs of public safety systems used for different types of operation, such as dispatch, personal location/identification, video/audio monitoring, telemetry, etc. different and if so, how should these differences be treated in establishing minimum performance guideline/standards?*

32. One approach would borrow from the wireless LAN example and continue to foster the creation of common standards supporting interoperability that would draw upon the expertise of the radio manufacturers in developing a set of minimum specifications.

*- In cases where a general communication service can be used in a safety of life or property mode (such as E911 and VHF marine), should receivers used with such services be subject to guidelines/standards for interference immunity similar to those for public safety of receivers when operating in a safety mode?*

33. The consequence of such an approach would be to raise the cost of the general communications service receiver since the public safety standard would impose a more stringent set of specifications the manufacturers of the general service radios would have to meet.

*[FCC] 26. As an illustration of a current approach on receiver standards for public safety services, the Public Safety National Coordination Committee (hereinafter the "NCC") has identified technical standards for radio receivers operating on the interoperability channels in the 700 MHz public safety band. It has also proposed that these standards be incorporated into*

*the equipment certification requirements of Part 90, Subpart R of our rules, 47 C.F.R. 90, Subpart R. In developing these proposals, the NCC considered recommending a metropolitan statistical area interference environment and a less stringent rural service area interference environment. However, it concluded that all of the receivers operating on the interoperability channels of the newly allocated 700 MHz public safety band should meet the metropolitan environment standard partly because of their public safety nature, and partly because of the inherent difficulty of enforcing a rule that specifies that certain radios can be used only in certain geographic areas. The NCC also decided not to specify receiver standards for radios operating on the non-interoperability channels in the 700 MHz public safety band since the technologies to be used in that portion of the band are not fully known. It deferred to the marketplace on that issue.*

*We request comment on the possible use of similar approaches, including the reliance on a national committee process for development of receiver immunity standards for other public safety bands.*

34. The NCC case is instructive in that they concluded that rigorous specification of receiver performance might actually curtail future performance improvements and would also result in an unwieldy regulation. Public safety is not a static situation as new technologies permit enhanced services and capabilities. As the NCC determined, allowing the marketplace to drive new designs within the existing public safety guidelines was a better way to insure that overall system performance would improve over time.

*[FCC] 29. We believe it is appropriate to examine mobile receiver immunity performance in the light of our changing spectrum management policies, and particularly to determine whether the operation of these devices and spectrum efficiency could be enhanced by development of minimum receiver performance specifications.*

*We request comment on the need for mobile radio immunity guidelines/standards and responses to the following questions on this issue:*

*- What minimum interference immunity performance would be appropriate for mobile service receivers and how those minimums compare to the performance of existing mobile service receivers?*

*- Should mobile receivers be subjected to more stringent minimum performance requirements than receivers for other communications services, given the higher variation in operating environment conditions experience in the course of mobile operation?*

*- Would the specifications established under such an approach have an impact on the practical requirements of mobile equipment for small size and light weight?*

*- To what extent are the reliability needs of the various types of mobile radio services different and how should these differences be treated in establishing minimum performance guidelines/standards?*

35. Our view is that the current approach is generally sufficient with regards to receiver design. Defining the class of service in terms of transmitter power, transmit spectrum, modulation type(s), frequency band(s), allowable spurious emissions, and the nature of the service provides much of the information needed by manufacturers. The manufacturer of the receiver should be allowed to make the design cost decisions and apply any innovative ideas in providing a better product.

*[FCC] 30. Fixed terrestrial services – Fixed terrestrial services include point-to-point and point-to-multipoint facilities. Point-to-point operations usually use highly directional transmit and receive antennas in order to minimize the potential for receiving interference and causing interference to others. …..*

*- We request comment on the need for interference immunity guidelines/standards for fixed terrestrial receivers in light of our changing approach to spectrum management, particularly with regard to licensing of frequencies on a geographic basis.*

*- We recognize that in many cases, fixed terrestrial facilities, particularly those used for point-to-point operations, are designed for high reliability. Do existing design features for ensuring high reliability include measures for immunity to interference?*

*- We also recognize that certain terrestrial point-to-point and point-to-multipoint receivers are designed to accommodate a wide bandwidth (e.g. Cable Television Relay Stations that deliver 80 video channels or more.) The receivers of such systems, by design, have little interference immunity. Should immunity guidelines/standards apply to such receivers?*

*- Should fixed terrestrial receivers be subjected to less stringent minimum interference immunity performance requirements than receivers used with other types of services, given the lesser variation in operating environment conditions generally experienced in the course of fixed operation?*

*- If minimum interference immunity performance guidelines/standards would be appropriate for fixed terrestrial service receivers, what minimum parameter values should be specified and how would those minimums compare to the performance of existing equipment used with these services?*

36. As we have stated elsewhere, defining the class of service in terms of transmitter power, transmit spectrum, modulation type(s), frequency band(s), allowable spurious emissions, and the grade of service provides much of the information needed by manufacturers. In the case of fixed terrestrial services, the high grade of service required by fixed networks sets the system (and hence, receiver) performance.

*[FCC] D. The Impact of Minimum Performance Specifications for Receiver Immunity on Innovation and the Marketplace*

*[FCC] 37. Receiver interference immunity performance specifications have the potential to impact receiver markets in various ways depending on how they are implemented. …. We request comment on the impacts of receiver immunity performance specifications on innovation and markets for receiver equipment. Commenting parties are specifically asked to respond to the following questions:*

> *- What effects would interference immunity performance specifications, in the form of either voluntary guidelines or mandatory standards, have on innovation in equipment design, performance (especially with regard to performance not addressed by specifications) and features?*
>
> *- What effects would such specifications, again in the form of either voluntary guidelines or mandatory standards, have on receiver markets in terms of cost of production, price and availability of equipment, and user demand?*
>
> *- What aspects of specifications would have the greatest impacts on innovation and markets and what steps could be taken to minimize or mitigate their impacts?*
>
> *- To what extent should assessments of the impact on innovation and markets be a factor in the processes that define guidelines and standards?*

37. Our general response to the previous set of questions is that defining the class of service in terms of transmitter power, transmit spectrum, modulation type(s), frequency band(s), allowable spurious emissions, and the grade of service provides much of the information needed by manufacturers. The manufacturer of the receiver should be allowed to make the design cost decisions and apply any innovative ideas in providing a better product.

*[FCC] E. The Current Receiver Environment*

*[FCC] 38. The current population of radio receivers generally is subject only to rules limiting the amount of unintentional emissions they may radiate. Thus, existing receivers are, for the most part, built to provide levels of interference immunity as determined necessary by their designer/manufacturer to provide satisfactory service. This has, of course, resulted in a wide range of immunity performance across products used within the same services and across services. We seek to develop information describing the interference immunity characteristics of receivers used in the various radio services.*

*We ask for comment and information in response to these specific questions:*

> *- How do existing receivers used with the various radio services perform with regard to each of the immunity attributes discussed above?*
>
> *- How many units with these capabilities are currently in service?*
>
> *- What is the expected remaining service life of existing receivers?*

38. Receiver performance does indeed vary widely for devices meeting a given industry standard. In any market there are products that perform well and others that are not on the same level. We believe that educating users will, over time, promote the improvement of equipment through market acceptance.

*[FCC] F. Treatment of Existing Receivers*

*[FCC] 39. There are literally billions of receivers currently in use with the various radio services. …*

*[FCC ] 40. Looking at this subject more generically, we observe that in situations where we adopted spectrum policies that assumed receivers performed in accordance with a given set of interference immunity specifications, it is likely that many of the existing receivers could continue to provide satisfactory service. … Accordingly, one approach would be to simply allow users to change to new receivers as they encountered interference. …. We request comment and suggestions on the matter of how to treat existing receivers that do not comply with any new receiver minimum interference immunity specifications that may be developed, and how the size of the installed receiver base should affect the development of receiver interference immunity performance guidelines/standards. We specifically ask that interested parties address the criteria that we should use in making determinations to take actions that would involve the involuntary replacement of receivers, either on a rapid or transitional basis, for example, in the case of public safety, other services involving safety-of-life or property, or services involving security of the public or national security. In the event such an action were determined to be necessary, what would be an appropriate phase-in time period?*

39. Any mandated equipment exchange for non-public safety services should be encouraged by means of economic incentives (e.g., substantial discounts on the newer equipment). The time period could be based on some portion of the calculated life-time of the equipment. Many people are already familiar with the idea of software upgrading and accept the necessity of doing so. Equipment manufacturers can pursue an analogous approach in promoting radio hardware changeovers.

Respectfully submitted,

/s/
Carl R. Stevenson
Chair, IEEE 802.18 Radio Regulatory Technical Advisory Group
4991 Shimerville Road
Emmaus, PA 18049
610-965-8799
carl.stevenson@ieee.org